Parental use of 'cry it out' in infants: No adverse effects on attachment and behavioural development at 18 months

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Abstract

Background: Leaving infant to cry it out has been the subject of discussion among researchers and parents. Nevertheless, there is paucity of empirical research investigating the association between leaving infant to cry it out and consequent crying duration and frequency, mother-infant attachment and behavioural development.

Methods: The sample with complete longitudinal data comprised 178 infants and their caretakers. Parental use of 'Leaving infant to cry out' and cry duration were assessed with maternal report at term, 3, 6 and 18 months, and frequency of crying was assessed at term, 3 and 18 months of age. Attachment was measured at 18 months using the strange situation procedure. Behavioural development of the infant was assessed with two observational measures and a parent-report questionnaire at 18 months.

Results: The use of 'Leaving infant to crying' was rare at term and increased over the next 18 months. 'Leaving infants to cry it out' at term was associated with a decrease of crying frequency at 3 months. Furthermore, leaving infants to cry it out a few times at term and often at 3 months was associated with shorter fuss/cry duration at 18 months of age. No adverse impacts of leaving infants to cry it out in the first 6 months on infant-mother attachment and behavioural development at 18 months were found.

Conclusions: Contemporary practice of some parents in the UK to occasionally or often 'Leaving infant to cry it out' during the first 6 months was not associated with adverse behavioural development and attachment at 18 months. Increased use of 'Leaving to cry it out' with age may indicate differential responding by parents related to infant self-regulation.

Keywords: crying, cry-it-out, attachment

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Introduction

Should you leave an infant to cry it out or respond immediately and attempt to soothe him/her? This has been the subject of vehement discussion between attachment theorists and behaviourists since half a century ago (Bell & Ainsworth, 1972; Gewirtz & Boyd, 1977) and is a perennial concern for both researchers and parents (Blunden, Etherton, & Hauck, 2016; Ramos & Youngclarke, 2006). Attachment theorists recommended mothers to provide prompt response to infant crying according to infants' needs. On the other hand, they have advised against leaving infants to cry it out due to having concerns about its potential negative impact on the development of infant-mother attachment (Bell & Ainsworth, 1972). In other words, they have suggested that immediate responsiveness reflects sensitive parenting (Bell & Ainsworth, 1972). Indeed, there was support for this claim in an early small-sample (N= 26) naturalistic study conducted by Bell and Ainsworth (1972). In this study, the number of crying episodes that is ignored by the mother, the duration of maternal unresponsiveness and duration and frequency of the infant crying were observed at home during the first year at each of the 4 quarters for approximately 4 hours during each visit. Findings of this study showed that as the number of ignored crying episodes increased, the frequency of crying also increased. Furthermore, it was shown that when the duration to respond to infant's crying signal increased, the duration of infant crying increased both concurrently and prospectively (Bell & Ainsworth, 1972). It was further shown that increased crying at 3 months was associated with insecure attachment at 12 months (Ainsworth, Blehar, Waters, & Wall, 1978). In contrast, pure behaviourists argued that leaving infants to cry it out would reduce the duration of crying, whereas immediate responding would reinforce the crying behaviour (Gewirtz & Boyd, 1977).

Surprisingly, despite it being an old controversy, there have not been many attempts to replicate the findings of Bell and Ainsworth's (1972) study. A few early attempts revealed

support for the findings of Bell and Ainsworth's (1972) study, however they had some methodological shortcomings such as failure to measure maternal unresponsiveness, short follow up periods (i.e., 3 months) or reporting on cross-sectional associations (Belsky, Rovine, & Taylor, 1984; Crockenberg & Smith, 1982; Grossmann, Grossmann, Spangler, Suess, & Unzner, 1985). In the only complete replication study (van IJzendoorn & Hubbard, 2000), a sample of 50 mother-infant dyads were recruited to examine the association between frequency (i.e., percentage of infant crying ignored by the mother), and duration of maternal unresponsiveness (i.e., percentage of the time infant cried before maternal response) and consequent infant crying duration and frequency over a 9 months period. The study further explored the association between frequency and duration of ignoring infant crying and attachment classification at 15 months. Findings revealed that the frequency of ignoring infant's crying signals during the first 9 weeks particularly was associated with a decrease in the frequency of infant crying 9 weeks later. However, there were no significant associations between duration of infant crying before maternal response and later crying duration of the infant. Furthermore, frequency and duration of infant crying ignored by the mother did not differentiate infant-mother attachment classifications prospectively. Thus, waiting longer to respond to crying may allow the infant to make attempts of self-soothing before responding. This is contrary to the assertion by early attachment theorists that immediate responding should reduce crying (Bell & Ainsworth, 1972) and partly supportive of a behavioural control interpretation (Gewirtz & Boyd, 1977). Therefore, the existing two studies provided contradictory findings.

The current study has two objectives. Firstly, to examine the association between the frequency of parents leaving their infant to cry it out anytime during the day at term, 3 and 6 months and cry duration and frequency during infancy at subsequent assessment points (i.e., 3, 6 or 18 months). Secondly, to investigate the association between frequency that parents leave

their infant to cry it out during the first 6 months of infancy and attachment type and behavioural outcomes both directly observed or reported by the mother (i.e., social referencing, easiness, task persistence, aggression, poor attention/hyperactivity) at 18 months of age.

Methods

Participants

Participants were recruited at three hospitals in the East of England when they were born. The infants were assessed longitudinally at term, 3, 6, and 18 months. The sample of this study with complete longitudinal data comprised 73 very preterm/very low birth weight (VP/VLBW (< 32 weeks gestation or <1500g birth weight) and 105 full-term infants and their mothers. Previous studies revealed no difference between the VP/VLBW and full-term samples in crying problems at 3 and 6 months and maternal sensitivity (Bilgin & Wolke, 2015, 2016). Thus, VP/VLBW and full-term samples were combined to allow for sufficient statistical power while controlling for any effect of preterm birth in all analyses. There were 101 (56.7%) male and 77 (43.3%) female participants. The mean gestational age was 35.03 (*SD* = 4.91) weeks and the mean birth weight was 2408.98 (*SD* = 1061.81) grams. Forty-one percent of infant participants had no siblings, 39% one sibling and the remaining 20% participants had more than one sibling. Furthermore, 40% had low to moderate income (yearly income of <£25k). Mean maternal age was 30.6 (*SD* = 5.82) and 34.5% of the infants' mothers had education for more than 10 years (Table 1).

Measures

Leaving Infants to Cry it Out: Mothers were asked to report on the frequency of 'Leaving their infant to cry it out' with the following question at term, 3, 6 and 18 months: 'Have you ever tried leaving your baby to cry it out during this time?' The answers were as follows: never, once, a few times and often. It was decided to combine the response options of 'never' and 'once' into one group, which comprised 'no cry-it-out' group since few responded

leaving their infant to cry it out 'once' (22 (12.8%) at term, 9 (5.1%) at 3 months, and 16 (9%) at 6 months). Thus, the analysis included three groups: no cry-it-out, a few times and often.

Crying Duration and Crying Frequency: Mothers were asked to report how long their infant fussed/cried during the morning, afternoon, evening and at night in minutes yesterday at term, 3, 6, and 18 months and the number of bouts of fussing/crying during morning, afternoon, evening and night yesterday at term, 3, and 18 months using the Crying Pattern Questionnaire (St James-Roberts & Halil, 1991). Durations and bouts of fussing/crying during morning, afternoon, evening and night were summed to create overall cry duration and frequency of crying measure. The validity of this questionnaire has been shown to be moderate to good (r= 0.51- 0.58) for cry duration and moderate for fuss/cry bouts (r=0.27-0.51) when compared with a standard fuss/ cry seven day diary (Wolke, Meyer, & Gray, 1994).

Attachment: Attachment type was assessed at 18 months with the strange situation procedure (SSP), a widely used and well-validated laboratory procedure to measure the quality of attachment (Ainsworth, Blehar, Waters, & Wall, 1978). The coders were blind to child and family characteristics and infant crying history. A third (32%) of the tapes were randomly selected for inter-rater reliability assessment, which was found to be acceptable (κ= 0.76). A categorical variable was created to measure attachment insecurity: 0=secure versus 1=insecure (insecure-avoidant and insecure-resistant).

Attachment disorganization scores were coded according to Main and Solomon's (1990) continuous scale and a categorical variable was created: 0= organized versus (<5) 1= disorganized (≥ 6). Please see supplementary file 1 for full description.

Observer-Rated Behaviour: Infant behaviour was assessed with two different observational measures. The first assessment was the Play Observation Scheme and Emotion Rating

(POSER) at 18 Months (Wolke, Bilgin, & Samara, 2017). POSER is an observational measure to rate maternal and infant behaviours, which includes play with a toy and free play, each lasting 2.5 minutes. Scales in both sessions were rated by two independent researchers who were blind to child characteristics. Each episode was viewed by the researchers a minimum of three times, focusing firstly on maternal behaviours, followed by infant behaviours and mother-infant joint behaviours. Overall, the coding procedure took approximately half an hour per infant-mother dyad. Infant behaviours were rated on two sub-scales using 9-point Likert scales (1= very low, 9 = very high). First, activity, intensity and persistence/attentiveness were combined to a scale of Poor Attention/ Hyperactivity. Internal consistency was found to be moderate ($\alpha = 0.71$) and the inter-rater reliability was found to be $\kappa = 0.90$. Second, social referencing, emotional tone and amount of vocalization were combined to an overall scale of Social Referencing, i.e. showing positive emotional expression, vocalization and integrating mothers' suggestions in behaviour ($\alpha = 0.70$). The inter-rater reliability was found to be $\kappa = 0.91$.

The second assessment is the Tester's Rating of Infant Behaviour (TRIB) completed by a trained examiner during the Bayley Scales assessment (Jaekel, Wolke, & Bartmann, 2013; Wolke, Skuse, & Mathisen, 1990) at 18 months. Observations lasted on average 45 minutes and 20% of the assessments were videotaped and rated by independent examiners for reliability assessment. Behaviours were rated on a nine-point Likert scale ranging from 1=very low to 9=very high. The six rating scales attentiveness, competence, cooperativeness, robustness/endurance, low demandingness and difficultness were combined to an overall Scale of Task Persistence with high internal consistency ($\alpha = 0.95$) and $\kappa = 0.93$ inter-rater reliability. Ratings on adaptability, initial approach to examiner and emotional tone were combined to a total scale labelled Easiness, which had high internal consistency ($\alpha = 0.87$) and $\kappa = 0.90$ inter-rater reliability.

Parent-Rated Behaviour Problems

Parents rated the behaviour of their 18-month-old infants using the Child Behaviour and Health Questionnaire (CBHQ). The questionnaire consists of 35 items adapted from three validated scales for older children: the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), ADHD Rating Scales (DuPaul, Power, Anastopoulos, & Reid, 1998) and the Child Behaviour Checklist (CBCL; Achenbach, 1991). The two scales derived from principal component analysis were poor attention/hyperactivity and aggression (see for details -Supplementary Table 1) and had good internal consistency ($\alpha_{\text{poor attention/ hyperactivity}}$ = 0.84; $\alpha_{\text{aggression}}$= 0.74).

Maternal Sensitivity

Maternal sensitivity was observed at 3 and 18 months of age. At 3 months of age, maternal sensitivity was measured with the Mother-Infant Structured Play Assessment (MISPA; Bilgin & Wolke, 2017) during 2 minutes of play with a toy and 2 minutes of free play. Maternal sensitivity was coded using a 5-point scale of maternal positive emotion expression, sensitivity, and stimulation adapted from 3 interaction coding schemes: the Play Observation Scheme and Emotion Ratings: POSER (Wolke, 1986); the Emotional Availability Scales: EAS (Biringen, 1993); and the Infant and Caregiver Engagement Phases: ICEP (Weinberg & Tronick, 1998). The inter-rater reliability scores for each item were high (κ= 0.76, κ= 0.76, κ= 0.78) and the overall internal consistency of the maternal sensitivity factor was moderate (α= 0.73).

At 18 months, maternal sensitivity was observed with the POSER (Wolke, 1986; Bilgin & Wolke, 2017), the same mother-child interaction observation we used to rate infant behaviour (see above). The maternal sensitivity factor consisted of maternal positive emotion expression, sensitivity, and appropriateness of play each rated on a 9-point Likert scale (1=

low; 9= high). The inter-rater reliability of each of the maternal behaviour items ($\kappa_{positive\ emotion}$= 0.93, $\kappa_{sensitivity}$= 0.90, $\kappa_{appropriateness\ of\ play}$= 0.91) was high. The ratings on the three items during the unstructured and structured play situation were totaled for an overall maternal sensitivity score, which had high internal consistency (α= 0.90).

Statistical Analysis

Analyses were performed using SPSS Version 23. Logistic regression and multiple regression analyses were used to analyze the association between leaving infant to cry it out at term, 3 and 6 months and the outcome variables which were a) crying duration and frequency of crying at the subsequent assessment point (3, 6, 18 months); b) attachment (insecure or disorganized), observer-rated behavioural development (poor attention/ hyperactivity, social referencing (POSER) and task persistence, easiness (TRIB) and parent-rated behavioural outcomes (poor attention/hyperactivity and aggression) at 18 months. Differences in sample characteristics across the three groups of 'Leaving infant to cry it out' (0= Never, 1= A few times, 2=Often) were analyzed using X^2 tests and one-way ANOVAs. We applied Bonferroni correction to account for multiple comparisons.

Income (0= £0–£25k, 1= >£25k), preterm birth (0= Full-Term infants; FT, 1= Very Preterm/Very Low Birthweight infants; VP/VLBW), being first born and crying duration or frequency at the previous assessment point were included as covariates in all analyses. Sensitivity analysis was performed, where all analyses were repeated excluding very preterm born participants. Statistical significance was defined as $p < .05$.

Results

Characteristics of Participants according to Leaving Infant to Cry it Out

Figure 1 shows the frequency of leaving infant to cry it out during the first 18 months. The majority of the parents reported never leaving their infants to cry it out at term (N= 109, 63.4%), although as time went on more parents reported leaving infant to cry it out a few

times (N= 50, 29.1% at term; N= 87, 48.9% at 3 months; N= 87, 52.1% at 6 months; N=65, 36.9% at 18 months) or often (N= 13, 7.6% at term; N= 23, 12.9% at 3 months; N= 13, 7.8% at 6 months and N=55, 31.3% at 18 months).

High income mothers most frequently never left their infant to cry it out at term (69.8%) and 3 months (44.1%) (Table 2). At 6 months, mothers who never left their infant to cry it out were older (M= 32.6, SD= 4.7) in comparison to those who left their infant to cry it out often (M= 25.2, SD= 5.8). At 18 months, mothers who left their infant to cry it out more often had higher maternal sensitivity (M= 6.42, SD= 1.46) in comparison to those who left their infant to cry it out a few times (M= 5.74, SD= 1.30), while there were no differences in maternal sensitivity during play interaction at 3 months (Table 2). Supplementary Table 2 shows the bivariate correlations for all study variables.

Associations between Leaving Infant to Cry It Out and Cry Duration and Frequency During Infancy

Leaving infant to cry it out a few times at term was significantly negatively associated with crying duration at 18 months (β= -0.22, p= 0.004). Furthermore, leaving infant to cry it out often at 3 months had significant negative association with crying duration at 18 months (β= -0.17, p= 0.03). Otherwise, there were no significant associations between leaving infant to cry it out and crying duration at earlier assessments (Table 3).

Leaving infant to cry it out a few times (β= -0.17, p= 0.03) or often (β= -0.18, p= 0.02) at term were associated with frequency of crying at 3 months. No other significant associations were found between leaving infant to cry it out and the frequency of crying (Table 3). When the p-value was adjusted for multiple comparisons using Bonferroni correction (0.05/8= 0.006), only the association between leaving infant to cry it out a few times at term and crying duration at 18 months remained significant (β= -0.22, p= 0.004). When we repeated

the analyses excluding very preterm infants, findings remained the same (Supplementary Table 3a).

Associations between Leaving Infant to Cry It Out at term, 3 and 6 months and Attachment at 18 Months

There were no significant associations between leaving infant to cry it out during the first 6 months and insecure or disorganized attachment at 18 months (Table 4). When we excluded very preterm infants, findings remained the same (Supplementary Table 3b).

Associations between Leaving Infant to Cry Out at term, 3 and 6 months and Behavioural Development at 18 Months

Table 4 shows that there were no significant associations between leaving infant to cry it out during the first 6 months and behavioural development at 18 months as observed during a play situation (POSER) or a cognitive assessment (TRIB). Similarly, there were no significant associations between leaving infant to cry it out during the first 6 months and parent rated behaviour at 18 months (Table 4). When we excluded very preterm infants and the p-value was adjusted for multiple comparisons, findings remained the same (Supplementary Table 3b).

Discussion

This study found firstly, that frequency of leaving infants to cry it out in the first 6 months in infancy is not associated with an increase of crying duration or frequency of crying up to 18 months of age. Rather, cry duration was found to be lower at 18 months if parents left their infants to cry it out for a few times at term and often at 3 months. Furthermore, leaving infants to cry it out at term both a few times or often was negatively associated with frequency of crying at 3 months. The strength of the associations was weak. Secondly, frequency of leaving infants to cry it out in the first 6 months in infancy was not found to be

associated with either adverse behavioural effects on infant development or infant-mother attachment at 18 months of age. Thus, whether contemporary parents respond immediately or leave their infant to cry it out a few times or often might not be associated with short- or long-term adverse effects on infant behaviour or quality of infant-mother relationship during the first 18 months in this UK sample.

This study does not provide support for predictions made by either attachment theory or learning theory. Thus, we neither recommend leaving infant to cry out nor responding immediately. Rather our findings are consistent with an approach to parenting that is intuitive and adapts to infant demands according to infant regulatory competencies across infancy (Papousek & Papousek, 1996). In this UK sample, most mothers appear to intuitively follow a differential responsiveness approach with most of them responding immediately at term and then starting to adopt a differential response approach from 3 months onward. Crying in the first 3 months of age is biologically driven and patterns of crying (the crying curve) have been found to be similar across cultures and countries (Barr, 1990; Wolke et al., 2017). Up to 40% of crying in the first 3 months of life has been consistently reported to be inconsolable independent of highly responsive "proximal" care or not (Lucassen et al., 2001; St James-Roberts et al., 2006; Wolke et al., 2017). Furthermore, intervention studies found that increased maternal responsiveness to crying and close physical contact (i.e. carrying of baby), in particular for colic crying, did not reduce crying behaviour (Barr et al., 1991; Douglas & Hill, 2011; St James-Roberts, Hurry, Bowyer, & Barr, 1995). Thus, converging evidence suggests that neither immediate responding nor not responding during the first 3 months - as suggested by behaviourists - alters infants' crying duration subsequently in infancy. However, there may be a small association between leaving infant to cry it out at term and frequency of crying subsequently at 3 months. Likewise, the findings of the van Ijzendoorn

and Hubbard (2000) study, leaving infants to cry it out a few times is associated with a decrease in frequency of crying subsequently.

Leaving an infant to cry it out might not reflect parental neglect but it may rather reflect authoritative parenting which includes both limit-setting and high levels of emotional warmth (Baumrind, 1967). Delayed responding has been suggested for dealing with infant night waking signaled by infant crying from 6 months onwards. Hiscock et al. (2007) showed that intervention involving leaving infant to cry it out gradually at 7 months decreased night crying and thus, sleeping problems at 10 months and 12 months. This method of leaving infant to cry it out using a graded approach corresponds with the concept of authoritative parenting (Baumrind, 1967) and is consistent with a differential responsiveness framework (van IJzendoorn & Hubbard, 2000; Wolke, 2019). Helping infants to learn how to regulate their crying behaviour is a type of limit setting and considered beneficial when combined with parental warmth (Baumrind, 1967). This is consistent with the finding here that maternal sensitivity in play situations was not or positively associated (at 18 months) with leaving infant cry it out. On the contrary, trying to respond to a crying infant immediately every time might put mothers under a lot of stress, increase fatigue (Barr et al., 2014; Long et al., 2018) and may increase depression (Petzoldt, 2018). Moreover, mothers' own expectations of responding to their crying infants immediately might even increase later infant night waking (Galbally, Watson, Teti, & Lewis, 2018). For infants' healthy development, the importance of maternal self-care and good maternal mental health is invaluable (Kurth, Kennedy, Spichiger, Hosli, & Stutz, 2011). Knowing that leaving infant to cry it out gradually decreases maternal depression (Hiscock et al., 2007), it is more likely to be beneficial for infant emotional and behavioural development in comparison to having ill effects. However, the number of studies on leaving infant to cry it out is still scarce and longitudinal studies of different cohorts are needed to confirm this finding.

The second argument put forward against leaving infants to cry it out is that it may increase the risk of insecure mother-infant attachment as well as behavioural problems (Bell & Ainsworth, 1972; Murray & Ramchandani, 2007). The current study found no associations between leaving infants to cry it out during the first 6 months and insecure or disorganized attachment at 18 months consistent with the findings of van Ijzendoorn and Hubbard's (2000) study. Furthermore, no associations were found between frequency of leaving infants to cry it out and infant behaviour at 18 months. Similarly, sleep intervention studies and studies using time-out (Knight, Albright, Deling, Dore-Stites, & Drayton, 2019) have not shown any adverse effect of using a graded extinction approach in response to waking and crying at night on infant-mother attachment or behaviour after one year (Gradisar et al., 2016) and 5 years (Price, Wake, Ukoumunne, & Hiscock, 2012). Indeed, a majority of parents reported to be successful in adopting a behavioural approach in the community to deal with night waking and crying (Honaker, Schwichtenberg, Kreps, & Mindell, 2018). The children fell asleep faster and woke less within a week.

A further argument against leaving infants to cry it out has been the suggestion that it may increase infants' stress levels, which may be harmful to the infant (Etherton, Blunden, & Hauck, 2016; Murray & Ramchandani, 2007). However, there is no empirical evidence that leaving infants to cry it out actually induces stress to the infant. The only study on the stress levels of infants after a 5-day intervention program including leaving infants to cry it out gradually revealed no change in infant cortisol levels (Middlemiss, Granger, Goldberg, & Nathans, 2012). Short and long-term chronic stress impact humans differently (Monaghan & Haussmann, 2015) and early stress may increase adaptive strategies (Ellis & Del Giudice, 2019). It has been shown that short-term stress is beneficial in terms of its positive impact on resiliency to stress in later life (Ellis & Del Giudice, 2019; Monaghan & Haussmann, 2015). Differential responding as part of intuitive parenting provides infants the opportunity to

soothe themselves by waiting before intervening when crying and allows them to explore ways of self-soothing, acquiring a first sense of self, and regulating their behavioural state (Wolke, 2019). If leaving infants to cry it out is occurring within the context of a warm mother-infant relationship, no adverse impacts have been demonstrated.

This prospective longitudinal study has several strengths, including a larger sample than previous studies, adjustment for several important covariates, using repeated assessment of frequency of leaving infant to cry it out during infancy, observer assessed infant-mother attachment and the assessment of behavioural outcomes using both researcher observations and parental reports. There are also limitations. Firstly, frequency of leaving infant to cry it out and cry duration and frequency were assessed via maternal report. This assessment represents maternal perception of her own behaviour and her infant's crying behaviour. Direct independent observation over long periods would be desirable but is less feasible in a prospective study with a good sample size and repeated measurements. Where direct observations of crying amounts and maternal report have been compared, the correlations exceeded r=.80 (St James-Roberts, Hurry, & Bowyer, 1993). Furthermore, maternal report has the benefit of capturing behaviours over longer time periods. Secondly, the correlational design of the current study does not allow to determine if there is a causal relationship between leaving infant to cry it out and the assessed outcomes. However, randomization in controlled trials may not be possible due to strongly held views by parents. Thirdly, frequency of crying was not assessed at 6 months. Thus, the current study did not allow us to investigate the associations between leaving infant to cry out at 3 months and frequency of crying at 6 months. Fourthly, the validity information of CBHQ measure was not available. Nevertheless, this measure was formed by items from valid measures. Fifthly, the current study did not allow to distinguish between leaving infant to cry out during daytime and night time. Thus, we could not distinguish whether parents may wait less or longer when

intervening at day than night time. Future studies may address responsiveness to crying during daytime and night time separately. Lastly, the current study included a large group of infants who were born very preterm or very low birth weight (41%). All analyses were controlled for the role of very preterm birth. Furthermore, sensitivity analysis excluding very preterm born participants did not alter the main findings, revealing wider confidence intervals.

In conclusion, contemporary practice by some parents to occasionally or often 'Leaving infant to cry it out' during the first 6 months was not associated with adverse behavioural development and attachment at 18 months. Nor was 'Leaving infant to cry it out' associated with reduced maternal sensitivity in interaction at 3 or 18 months of age. Increased use of 'Leaving to cry it out' with age may indicate differential responding by mothers to aid the development of infant self-regulation.

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Table 1. Demographic Characteristics

Demographic Characteristics	Very Preterm	Full-Term	Total Sample
Infant Sex: N (%)			
Female	32 (43.8%)	45 (42.9%)	77 (43.3%)
Male	41 (56.2%)	60 (57.1%)	101 (56.7%)
Gestational Age (weeks)	29.42 (1.65)	38.94 (2.25)	35.03 (4.91)
Birth Weight (gr)	1285.75 (345.73)	3205.06 (554.13)	2408.98 (1061.81)
Birth Order: N (%)			
First Born	31 (42.5%)	39 (37.1%)	70 (39.3%)
Maternal Education			
≤10 years	45 (66.2%)	63 (64.9%)	108 (65.5%)
>10 years	23 (33.8%)	34 (35.1%)	57 (34.5%)
Maternal Age	30.5 (5.7)	30.7 (5.9)	30.6 (5.8)
Income: N (%)			
£0–£25k	30 (45.5%)	38 (36.5%)	68 (40%)
>£25k	36 (54.5%)	66 (63.5%)	102 (60%)
Breastfeeding: N (%)			
Term	21 (28.8%)	55 (52.4%)	76 (42.7%)
3 Months	13 (17.8%)	31 (29.8%)	44 (24.9%)
6 Months	10 (14.3%)	13 (13.4%)	23 (13.8%)
Sleeping in Parents' Room: N (%)			
Term	54 (74.0%)	76 (72.4%)	130 (73.0%)
3 Months	43 (58.9%)	60 (57.1%)	103 (57.9%)
6 Months	23 (31.5%)	0 (0.0%)	23 (12.9%)

Table 2. Characteristics of mothers and infants according to response to crying at term, 3 months, 6 months and 18 Months

		Leaving Infant to Cry it Out			
	Total Number	Never	A few Times	Often	p
Term					
Maternal Education					0.22
≤10 years	104	63 (60.6%)	30 (28.8%)	11 (10.6%)	
>10 years	56	40 (71.4%)	14 (25%)	2 (3.6%)	
Maternal Age	172	31.3 (5.3)	29.7 (6.6)	27.9 (6.4)	0.07
Income					
£0–£25k	68	37 (54.4%)	21 (30.9%)	10 (14.7%)	**0.01**
>£25k	96	67 (69.8%)	27 (28.1%)	2 (2.1%)	
Infant Sex					
Female	75	67 (69.1%)	23 (23.7%)	7 (7.2%)	0.19
Male	97	42 (56%)	27 (36%)	6 (8%)	
Preterm Birth					
Very Preterm	67	38 (56.7%)	21 (31.3%)	8 (11.9%)	0.15
Full-term	105	71 (67.6%)	29 (27.6%)	5 (4.8%)	
First born	67	46 (68.7%)	18 (26.9%)	3 (4.5%)	0.36
Breastfeeding					
Yes	74	51 (68.9%)	20 (27%)	3 (4.1%)	0.23
No	98	58 (59.2%)	30 (30.6%)	10 (10.2%)	
Sleeping at Parents' Room					
Yes	130	82 (63.1%)	37 (28.5%)	11 (8.5%)	0.72
No	42	27 (64.3%)	13 (31%)	2 (4.8%)	
3 Months					
Maternal Education					
≤10 years	108	38 (35.2%)	52 (48.1%)	18 (16.7%)	0.10
>10 years	57	25 (43.9%)	29 (50.9%)	3 (5.3%)	
Maternal Age	178	31.5 (5.5)	30.3 (5.9)	28.9 (6.2)	0.14
Income					
£0–£25k	68	20 (29.4%)	34 (50%)	14 (20.6%)	**0.04**
>£40k	102	45 (44.1%)	48 (47.1%)	9 (8.8%)	
Maternal Sensitivity	174	3.96 (0.51)	3.90 (0.61)	3.80 (0.51)	0.49
Infant Sex					
Female	77	29 (37.7%)	36 (46.8%)	12 (15.6%)	0.64
Male	101	39 (38.6%)	51 (50.5%)	11 (10.9%)	
Preterm Birth					
Very Preterm	73	26 (35.6%)	32 (43.8%)	15 (20.5%)	**0.04**
Full-term	105	42 (40%)	55 (52.4%)	8 (7.6%)	
First born	70	26 (37.1%)	34 (48.6%)	10 (14.3%)	0.91
Breastfeeding					
Yes	44	18 (40.9%)	22 (50%)	4 (9.1%)	0.66
No	133	49 (36.8%)	65 (48.9%)	19 (14.3%)	
Sleeping at Parents' Room					
Yes	103	38 (36.9%)	55 (53.4%)	10 (9.7%)	0.21
No	75	30 (40%)	32 (42.7%)	13 (17.3%)	
6 Months					
Maternal Education					
≤10 years	102	37 (36.3%)	54 (52.9%)	11 (10.8%)	0.16

>10 years	53	26 (49.1%)	25 (47.2%)	2 (3.8%)	
Maternal Age	167	32.6 (4.7)	30.3 (5.7)	25.2 (5.8)	<**0.001**
Income					
£0–£40k	63	21 (33.3%)	33(52.4%)	9 (14.3%)	0.06
>£40k	97	42 (43.3%)	51 (52.6%)	4 (4.1%)	
Infant Sex					
Female	71	23 (32.4%)	40 (56.3%)	8 (11.3%)	0.12
Male	96	44 (45.8%)	47 (49%)	5 (5.2%)	
Preterm Birth					
Very Preterm	70	30 (42.9%)	33 (47.1%)	7 (10%)	0.46
Full-term	97	37 (38.1%)	54 (55.7%)	6 (6.2%)	
First born	61	20 (32.8%)	37 (60.7%)	4 (6.6%)	0.24
Breastfeeding					
Yes	23	10 (43.5%)	12 (52.2%)	1 (4.3%)	0.79
No	144	57 (39.6%)	75 (52.1%)	12 (8.3%)	
Sleeping at Parents' Room					
Yes	23	13 (56.5%)	9 (39.1%)	1 (4.3%)	0.22
No	144	54 (37.5%)	78 (54.2%)	12 (8.3%)	
18 Months					
Maternal Education					
≤10 years	107	35 (32.7%)	38 (35.5%)	34 (31.8%)	0.51
>10 years	56	15 (26.8%)	25 (44.6%)	16 (28.6%)	
Maternal Age	176	30.4 (4.9)	31.2 (6.2)	30.4 (6.1)	0.64
Income					
£0–£40k	68	24 (35.3%)	25 (36.8%)	19 (27.9%)	0.57
>£40k	102	29 (28.4%)	38 (37.3%)	35 (34.3%)	
Maternal Sensitivity	166	5.82 (1.46)	5.74 (1.30)	6.42 (1.46)	**0.03**
Infant Sex					
Female	77	24 (31.2%)	29 (37.7%)	24 (31.2%)	0.98
Male	99	32 (32.3%)	36 (36.4%)	31 (31.3%)	
Preterm Birth					
Very Preterm	71	27 (38%)	31 (43.7%)	13 (18.3%)	**0.01**
Full-term	105	29 (27.2%)	34 (32.4%)	42 (40%)	
First born	70	22 (31.4%)	28 (40%)	20 (28.6%)	0.75

Please note that boldface type indicates significant differences.

Table 3. Predicting Cry Duration and Cry Frequency During Infancy according to Frequency of Leaving Infant to Cry Out

	Cry Duration at 3 Months		Cry Duration at 6 Months		Cry Duration at 18 Months		Cry Frequency at 3 Months		Cry Frequency at 18 Months	
	β	p	β	p	β	p	β	p	β	p
Leaving Infant to Cry it Out at Term										
Never	[reference]		[reference]		[reference]		[reference]		[reference]	
A Few Times	-0.08	0.24	-0.01	0.89	**-0.22**	**0.004**	**-0.17**	**0.03**	-0.03	0.69
Often	0.07	0.35	-0.05	0.56	0.05	0.54	**-0.18**	**0.02**	-0.04	0.61
Leaving Infant to Cry it Out at 3 Months										
Never			[reference]		[reference]				[reference]	
A Few Times			0.01	0.88	-0.03	0.74			0.13	0.09
Often			-0.05	0.51	**-0.17**	**0.03**			-0.10	0.24
Leaving Infant to Cry it Out at 6 Months										
Never					[reference]				[reference]	
A Few Times					0.15	0.06			0.14	0.09
Often					-0.07	0.36			-0.11	0.18

Please note that the analysis was controlled for income, preterm birth, first born and cry duration in the previous assessment for each regression

Table 4. Predicting Attachment and Behavioural Outcomes at 18 Months According to Leaving Infant to Cry it Out at Term, 3 and 6 Months

	Observer Ratings												Parent Ratings			
					POSER				TRIB							
	Insecure Attachment		Disorganized Attachment		Poor Attention/ Hyperactivity		Social Referencing		Task Persistence		Easiness		Poor attention/ Hyperactivity		Aggression	
	OR	95% CI	OR	95% CI	β	p	β	p	β	p	β	p	β	p	β	p
Leaving infants to Cry it Out at Term																
Never	[reference]		[reference]		[reference]		[reference]		[reference]		[reference]		[reference]		[reference]	
A Few Times	0.83	0.39-1.78	0.61	0.26-1.47	0.05	0.53	-0.09	0.25	-0.02	0.78	-0.02	0.75	-0.03	0.67	0.02	0.79
Often	0.87	0.23-3.3	0.81	0.19-3.51	-0.08	0.32	-0.09	0.27	-0.06	0.46	-0.06	0.42	0.08	0.36	0.03	0.72
Leaving infants to Cry it Out at 3 Months																
Never	[reference]		[reference]		[reference]		[reference]		[reference]		[reference]		[reference]		[reference]	
A Few Times	1.01	0.53-1.95	0.87	0.42-1.83	0.05	0.50	-0.12	0.12	-0.06	0.44	-0.05	0.52	-0.03	0.72	-0.08	0.29
Often	1.19	0.46-3.10	0.66	0.21-2.07	0.02	0.77	-0.01	0.92	-0.01	0.94	-0.01	0.97	-0.03	0.72	0.04	0.60
Leaving infants to Cry it Out at 6 Months																
Never	[reference]		[reference]		[reference]		[reference]		[reference]		[reference]		[reference]		[reference]	
A Few Times	1.20	0.58-2.46	0.86	0.39-1.91	0.05	0.52	0.01	0.92	-0.09	0.29	-0.08	0.32	-0.05	0.59	0.05	0.60
Often	1.12	0.31-4.10	1.10	0.27-4.80	0.03	0.74	-0.07	0.39	0.05	0.51	0.05	0.54	-0.07	0.43	0.07	0.39

Please note that the analysis was controlled for income, preterm birth, first born and cry duration in the previous assessment for each regression. POSER: Play Observation Scheme and Emotion Rating; TRIB: Tester's Rating of Infant Behaviour

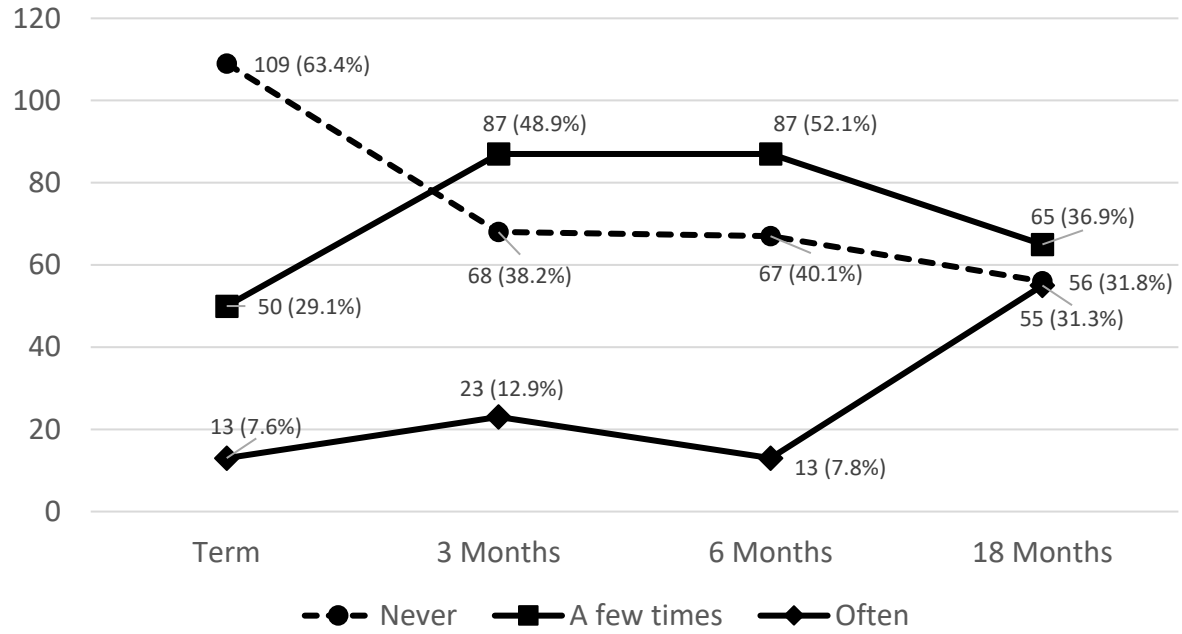

Figure 1. Frequency of leaving infant to cry out at term, 3, 6, and 18 months